XXXVIII. *Experiments on Ignited Subſtances. By Mr.* John Whitehurſt, *in a Letter to* James Stuart, *Eſquire, F. R. S.*

TO JAMES STUART, ESQ.

SIR,

London, Nov. 29, 1775.

R. May 23, 1776. THE experiments of Mr. BUFFON upon ignited bodies ſeem to prove, that, when heated to the degree he mentions, they are more ponderous than when cold. The experiments which I have made on heated metals, ſuggeſt a different idea, and contradict the fact he relates; ſo that I am induced to believe, that ſome circumſtance, not attended to, has introduced a miſtake in the relation this learned philoſopher has publiſhed as the reſult of his inquiry.

His experiment ſtands thus recorded (Suppl. Nat. Hiſt. vol. II. p. 11.): a maſs of iron, after receiving a white heat, weighed 49 lbs. 9 oz.; when reſtored again to the temperature of the atmoſphere 49 lbs. 7 oz. Hence he concluded, that the igneous particles, contained in the heated iron, increaſed its abſolute weight 2 ounces.

My experiments are as follows: 1ſt, One pennyweight of gold, made red-hot, became apparently lighter; but, when reſtored again to the temperature of the atmoſphere, its former weight was perfectly reſtored.

2d, One pennyweight of iron, heated as above, was alſo apparently lighter; but, when it became cool again, its weight was viſibly augmented.

It is now ſeveral years ſince I made theſe experiments; but I well remember to have repeated them ſeveral times, and that the reſults were always the ſame. It may be neceſſary to remark, that the beam uſed in theſe experiments was ſenſibly affected by the $\frac{1}{2000}$th part of a grain; and likewiſe, that each of the metals was heated upon charcoal, by means of a candle and a blow-pipe, and both were brought nearly to a ſtate of fuſion.

It ſeems needleſs to obſerve, that the apparent levity of the gold and of the iron, when hot, was owing to the aſcent of the rarified air above the ſcale, and to the tendency of that underneath to reſtore the equilibrium of its preſſure. The increaſe of weight in the iron might probably ariſe from its having, in ſome degree, acquired the property of ſteel, by means of the flame and charcoal.

I am at a loſs to account for the fallacy which ſeems to have attended M. BUFFON'S experiment; but it ſeems probable, that the heat of the maſs of iron employed by him, had a greater effect on that arm of the beam from which

which it hung than on the other, which being leſs heated, would conſequently be leſs expanded; and this difference of expanſion might produce the error in M. BUFFON's account of the weight of heated iron.

If theſe obſervations afford you any ſatisfaction, it will give me pleaſure.

I am, &c.

XXXIX. *An*